INFORMATION AND LEARNING EXPERIENCES IN THE CUBE:

VISION, IMPLEMENTATION AND INTERACTION

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PILOT STUDY PRELIMINARY REPORT
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Executive Summary

This project has commenced an exploration of learning and information experiences in the QUT Cube. Understanding learning in this environment has the potential to inform current implementations and future project development.

In this report, we present early findings from the first phase of an investigation into what makes learning possible in the context of a giant interactive multi-media display such as the QUT Cube, which is an award-winning configuration that hosts several projects.

Project Aims and Goals

The research aims to understand what makes learning possible in the Cube. This is achieved through working with three groups of participants (Cube managers and policy makers, Cube application designers and developers, and Cube visitors) to investigate:

- **Vision**- What kinds of learning experiences were planned in the establishment phase? (The Intended Cube)
- **Implementation**- What kinds of learning experiences were made possible through the design and implementation of specific projects? (The Enacted Cube)
- **Interaction**- What learning experiences occurred for people interacting with the system? (The Experienced Cube)

Preliminary Findings about the Experienced Cube

In this report, preliminary findings about the Experienced Cube are presented. These findings are obtained from analyzing nine interviews with visitors as well as observation of interactions occurring in the Cube environment. The findings are categorized into three groups:

- How do visitors experience the Cube?
- What do visitors learn in the Cube?
- How do visitors learn in the Cube?

Visitors' experiences of the Cube

- As an individual, isolated wall
- As a series of unconnected walls
- As a complex of inter-related walls
- As walls that are dependent on effective use of the wider space
- As an implementation of cutting edge technology
- As something other than wall applications

What do visitors learn in the Cube?

The findings show a mix of learning about both technology and content in the Cube.

- Technology
- Content

How do visitors learn in the Cube?

Research participants expressed that they learn in the Cube through:

- Intuitive Interactive Features
  - Using features in common with other applications
  - Experimenting
  - Being stimulated to interact with technology
- Interpreting the Technology
- Social Context
  - Observing other people
  - Being approached by other people
  - Participating in a community
- Other observations
  - Experiencing through other technologies
  - Exercising personal creativity
  - Choosing points of interest

Possible future directions

- Extending the current research for studying other groups of participants, including school students and undergraduate students;
- Extending the current research for studying informal (visitor) learning;
- Designing “learning” studies that support proposed new projects;
- Technical data analysis.

Research Aims and questions

The present pilot study aims to investigate the experience of using the Cube to learn from the perspective of key stakeholders. The research questions addressed are:

- What are the key intentions around learning in the Cube? We call this the Intended Cube.
- What is done to enable learning to happen in the Cube? We call this the Enacted Cube.
- What learning results from experiencing the Cube; and how does that learning occur? We call this the Experienced Cube.

The findings associated with these three questions will be compared in order to 1) identify similarities and differences between the Intended Cube, the Enacted Cube and the experienced Cube; and 2) give insight into the relationship (or possibly gap) between the expectations and experiences of the three different stakeholder groups.

Method

The current study adopts a phenomenographic approach. In phenomenography, variation in experience is the key research object. Phenomenography aims to explore critical features of people's awareness or understanding of objects of study. In this research, variation in learning experiences in the Cube is explored from three different perspectives:

1. Intended Cube: learning experiences from the perspective of managers (Vision);
2. Enacted Cube: learning experiences from the perspective of designers and developers (Implementation);
3. Experienced Cube: learning experiences from the perspective of visitors (Interaction).

Participants and context

The research explores the perspectives of three groups, who are key players associated with learning in the Cube:

1. Cube policy makers: high-level managers of the Cube;
2. Cube builders: designers and developers of the Cube;
3. Cube visitors: the general public and QUT students.

Currently, ten interviews with Cube visitors have been conducted. For the next phase of analysis, four participants each from the first and second groups will also be interviewed.

Data gathering processes

For the purpose of data collection, two methods of interview and observation are being used. All three groups will be interviewed. The interaction of the group of visitors with the Cube will also be observed.

Interviews

Semi-structured interviews of approximately 45 minutes duration will be conducted with high-level managers, designers and developers of the Cube.

So far, 10 interviews with visitors have been conducted. Interviews with visitors are shorter in length (about 5 minutes). These interviews are conducted either with individuals or with small groups. In several cases, when interviewing individuals, the person turned to a companion or companions for more ideas.

Key questions for each group are shown in Appendix 1. Other questions may be asked, depending on the points raised by the participants. The focus is on creating a natural, free flowing conversation with the participant. General probe questions are used to elicit further information from participants about the responses they provide.

Observation

The researchers spent a total of 6 hours in the Cube for the purpose of observation. This included two Sundays, when families were exploring the Cube, and one afternoon during the week, when the Cube was occupied mostly by students.

During the observation of each individual, the researcher maintained sufficient distance to be relatively inconspicuous. She recorded observed behaviours in a notebook. These were interactions of individuals within the Cube environment, for example touching the walls, reading the content and interacting with others in the space. In general, the researcher observed :

- What spaces are being used?
- How are these spaces being used and what is occurring there?
- What appears to be informing visitors?
- What learning appears to be occurring?

Findings overview

We offer here preliminary findings, based on initial interviews with and observation of visitors.

How do visitors experience the Cube?

The interviews and observation reveal visitors experience the Cube environment in various ways:

1) The Cube experienced as an individual, isolated wall

When experienced this way, the Cube consists of individual, discreet sides. The presumption (initially) is that there is just one wall.

> *After the interview, one of the couples interviewed mentioned that they did not know that there were other screens in the space. However, becoming aware of this, one of them beautifully concluded, "That's right! A Cube has more than one side to offer!" (Obs. Saturday 28th Sept)*

2) The Cube experienced as a series of unconnected walls

Visitors experience the projects (i.e. walls) in distinct ways, noticing and appreciating the differences.

> *I like the three different ponds. The three different styles of information; like The Barrier Reef, and The Google with the flood information and the scientific sort of… It's not all on one content, if you like. It's not all one stream of information. I like the variety of walking around seeing different things (int. 3)*

3) The Cube experienced as a complex of inter-related walls/projects

Visitors experience the Cube holistically, as a complex system of many walls.

> *We haven't been here very long. We've had a go at a couple of the walls but we haven't explored much more of the Cube than that in this time.*

4) The Cube experienced as walls that are dependent on effective use of the wider space

The Cube is experienced in this way when visitors view walls from a distance, for instance when using sitting spaces provided:

> *A dad, sitting far from the GBR and looking at the screen as a whole, was making his kids aware of different objects on the screen. It seemed that distance observation on the screen was helping in seeing objects that were never noticed from a close distance (Obs. Sunday 22nd Sept)*

But it's also big enough, isn't it? That if there is some people doing it, you can see and learn from that and copy it on some other bit, you don't need to wait in a queue and [say:] "Oh! I'd like to have a go at that but there is no space to do it; because it's on a small scale or something" (int. 3)

5) The Cube experienced as an implementation of cutting edge technology

This is mainly an IT expert's way of experiencing the Cube. From this perspective, people think they are able to discern the underlying technical features of the Cube.

I'm trying to think what that program is... it's not program X. But it's like where you can brings up different screens and stuff like that which is just really quite awesome actually. And I'd look at something like that and see whether or not you could actually interact that with an information map outside when somebody is new to the area like we are, to come and be able to zoom in to certain points and zoom out and actually use that software to then look at restaurants and things like that (int. 5)

6) The Cube experienced as something other than wall applications

When experiencing the Cube this way, the wall applications are not sites of learning. Rather, the Cube is constituted as work spaces provided for visitors, in particular students to work on their university projects. The walls are in the background of awareness of these visitors.

During the time of observation (10 minutes for each application), no interaction occurred in front of the three applications (The Great Barrier Reef, Physics Playroom, ECOS). This is while the Cube had almost a busy time full of students, who were working with their own laptops or the computers available in the Cube. They were probably busy with their assignments. Some of them were working individually and the others in groups. They barely seemed to be paying attention to the applications (Obs. Wednesday 26th Sept)

What do visitors learn in the Cube?

A preliminary analysis has revealed that the overall experience of visitors in the Cube is a mix of learning about 1) technology and 2) content.

1) What is learned about technology?

The data from the interviews suggests that learning about technology is experienced in two different ways, learning about:

i. what type of technology has been used in the space (and probably inspired by that)

It's interesting how quickly we learnt how to operate it without needing instruction manuals or complicated "how to do it". It's user-friendly, very easy to understand and follow (int. 3)

what I've learnt is actually about the way of displaying information and how interactive can be a good tool for passing on information to others who don't know. So, more so about the method of imparting information through this technology (int. 9)

ii. how to work with the technology (which could be through working with similar but smaller-scale devices)

IT expert- It's things I've seen before. I don't think there is anything really I learnt from an IT perspective. Just interesting, seeing those things applied (int. 5)

A Cube visitor was treating the Community Science Wall like an iPad. The visitor was using his fingers to zoom in on the Google map like as he did when zooming in and out on an iPad. He did not have any success, so gave up and stepped back. However, after a while, he noticed the zooming buttons near the screen and decided to try again. He succeeded and continued his interaction (Obs. Sunday 22nd Sept)

2) What is learned about content?

According to participants, learning experiences may also occur in terms of content.

I was learning about the striped snapper, because I wasn't quite sure what they were.… What else? [wondering] I was learning about the different clams, the different fish and animals that I didn't know about before. So, yeah! Definitely [I learned something here] (int. 2)

the fish here are beautiful. And just finding out what the names of the fish are (int. 8)

It seems that for most of the participants, this experience happens when they are interacting with The Great Barrier Reef, which provides them with information about the objects on the screen.

Some content is only partially learned. Based on observation of the Physics Playroom, the key feature of gravity is not visible enough to be learned easily and quickly by many of the visitors. Lack of visibility of the interactions caused by what a visitor did on the screen prevented visitors from having a clear idea of how gravity changed in the room. Some features of gravity were only partially visible for some visitors.

A boy throws up a ball in the Physics Playroom but due to low gravity, the ball does not come back. He is wondering "why?". His father is also watching this and he is waiting for the ball to come back, but this does not happen. He does not seem to have an answer for this or he does not want to confuse his son by explaining this. They start to work with something else (Obs. Sunday 29th Sept)

Although very close to the screen (Physics Playroom), an 8-9 year-old kid who is changing the gravity setting, notices that the planet on top of the screen is receding. However, the observer does not think that the boy notices the relationship between what he is doing and what is happening there. (Obs. Saturday 28th Sept)

How do visitors learn in the Cube?

The interview and observation data also reveals variation in what visitors identified as helping them to learn about the technology or content.

1) Intuitive interactive features

Visitors of the Cube may learn about the technology/content by means of intuitive interactive features.

a) Using features in common with other applications

And with the fish, there is the letter "I" to show you to touch there (int. 3)

Interviewee- After you press the button, reading about the fish.
Interviewer- What helped you to know that you should press the button?
Interviewee- Cause there was a button there to press. The little ring… If you put your finger on it, the little ring pops up.
Interviewer- And what helped you to know that you should put your finger there?
Interviewee- Because you just press buttons. It's just natural to press a button! … To see what comes up! (int. 8)

b) Experimenting with how the technology works

By eventually working out which combination of touching and clicking and moving your fingers around got the right menus to come up, but that took a little while to work out. … I'm not quite sure how I did it actually, I think I just worked out if you sort of touch and hold the creature that you want to look at and kind of open your fingers more, then it will give you the next menu (int. 7)

We started touching the screen and gradually sort of figured out that creatures will respond to you when touching the screen… Cause there are

no instructions around, so you just get on up and you just give it a go and you just start working with it (int. 9)

c) Being stimulated to interact with the technology because it's possible and easy

We found the original idea by accident, in that it was moving across the screen in front of you. So, you saw the eel or whatever or the little blue fish or things or Nemo! [You would say:] "Oh! That's interesting! We'll have a look at that!" Whereas you probably wouldn't sit in your lounge and think: "I need to find about Nemo or that blue fish or..." So, because it was here, you made the effort to stop it. It was easy to stop and look and learn from it (int. 3)

2) *Expert's experiences of interpreting the technology*

Visitors with an IT background experience learning through interpreting the technology.

Interviewee M- sort of seeing it from two levels: 1) the kids coming in and flinging things around the room, which is great. Just the ability to interact with all the objects and turn them and just seeing the physics behind it I guess was interesting for me; the way it's all been set up with the touch screens.

Interviewee F- Yeah! Cause we both work in IT, so it's fascinating for us to actually look at the interaction and the touch screen and how actually it works and what is behind what you are seeing on the screen and stuff like that. Hence, me flipping round the actual screens is to try to get more information around what you are actually using, what the coding is and stuff like that, concerning the music and the actual interaction with the items on the screen really. So was interesting from an IT perspective and a technology perspective (int. 5)

3) *Social context*

The social context of the Cube helps individuals to learn. The individual may learn by:

a) Observing other people

Probably because other people were there doing it ... And you can watch the kids: how quickly they pick it up. And then we copy the kids. In our age!… And you watch other people; you learn about other people watching it. Watch other people's reactions; specially the kids. I love watching the kids being fascinated by what they are doing (int. 3)

You kind of can see other people doing it as well. Then you can just see what you have to do; and just hold your finger down (int. 2)

b) Being approached by other people

But also a child actually showed us how to get more out of it, how to get the information screens and the trophic charts to come up, how to manipulate the images more than what we intuitively just sort of discovered on our own. So, we were doing that for probably about ten minutes and then a little girl who was probably about 4 or 5 herself came up and said: "Well! This is how you do it!" So, that was quite interesting (int. 9)

I saw a little kid that actively approached a stranger couple who was struggling to interact with The Great Barrier Reef to show them how to do it. (Obs. Sunday 22nd Sept)

c) Participating in community

Overall, it seemed a collaborative space in which people (parents, kids, couples, friends, etc.) were teaching each other how to interact with the applications and sharing their discoveries about this interactive space. (Obs. Sunday 22nd Sept)

The technology is really interesting. [For] bringing things to life. And the size! So, it's one thing to do a Google earth on a computer screen, but to have that big screen, we can all share together was fabulous (int. 3)

4) Other observations

Visitors also learn through:

a) Experiencing through other technologies

I think working out that it doesn't work like a Mac touch screen so much helped really in the end (int. 6)

Interviewee M- I mean I described it to my son: "it's the largest iPad we've ever seen. So, that's how I described it to him and he understood that. Interviewee F- And he's four! And certainly our two year-old was able to manipulate the screens as well (int. 9)

b) Exercising personal creativity

A visitor was designing an activity for herself on the Physics Playroom. She moved wooden cubes to build a word with them; however, in the middle of her activity, she was distracted when she discovered another interactive object on the screen and then never got back to her word-building activity (Obs. Sunday 22nd Sept)

c) Choosing points of interest

> *Like with the individual fish, just by pressing on the information thing, you get that information about the fish and obviously, you can choose which ones you are interested in. So, you're more likely to learn, cause you've chosen what you were interested in, in the first place (int. 3)*

Future Directions

In this report, early findings of an investigation into learning experiences in the QUT Cube were presented. This included an overview of visitors' perspectives towards the Cube, what is learned in it and how this learning is occurring. The preliminary findings suggest that visitors do not really visit the Cube to learn specific things in specific ways, but what they learn and how they learn occur serendipitously.

The next steps of this research are to

- Develop the analysis of visitors experiences;
- Analyse the intended (vision) and enacted (implementation) experiences;
- Compare the findings about the intended, enacted, and experienced Cube to identify useful insights.

Possible future directions include:

- Extending the current research for studying other groups of participants, including school students and undergraduate students;
- Extending the current research for studying informal (visitor) learning;
- Designing "learning" studies that support proposed new projects; and
- Technical data analysis.

Appendix 1: Interview Questions for Cube visitors

Participants	Core Questions	Probe Questions
High-level managers	• Please describe your role in the Cube environment. • When planning the Cube, what did you want people to learn? • When planning the Cube, how did you expect people to learn? • When planning, what did you consider to be the key learning goals of the Cube environment?	• When you were developing a project in the Cube, how did you think people would use information to learn in the Cube? • What kinds of information did you think people would use as they learn in the Cube? • What did/do you see to be helpful/useful for people's learning in the Cube? • What did you see helps people to learn? • How did you make the Cube to help people to learn? (Group 2 only)
Designers, Developers, Curators, Educators	• What was/is your role, concerning the Cube? • What did/do you put into place to help people learn in the Cube? • What did/do you expect people to learn in the Cube? • How did/do you expect people to learn in the Cube?	• When you were developing a project in the Cube, how did you think people would use information to learn in the Cube? • What kinds of information did you think people would use as they learn in the Cube? • What did/do you see to be helpful/useful for people's learning in the Cube? • What did you see helps people to learn? • How did you make the Cube to help people to learn? (Group 2 only)

Visitors	• Why are you visiting the Cube?
	• Have you learned anything today in this place?
	  • What have you learned?
	  • How did you learn it?
		• What (information) helped you to learn that (i.e. whatever they have mentioned above) today?
		• How did you use information to learn? today?